DECLARATION OF MICHAEL A. MONTGOMERY (37 CFR 1.132)

Michael A. Montgomery hereby declares that:

I am an expert in the field of Wireline Communications.

I have a Masters degree in Computer Engineering and Computer Science from the Stanford University, graduating at the top of my class with a 3.97/4.00 average. I also have a Bachelor of Science degree in Electrical Engineering from the University of Tennessee, graduating at the top of my class with an average of 4.00/4.00.

From 1983 through 1994 I worked in the field of well-logging technology, and more specifically, worked in the field of well-logging wireline telemetry full time or as a consultant during that time.

I am the inventor on seven issued patents in the field of well-logging wireline telemetry:

US 6,175,599 METHOD AND APPARATUS FOR TRANSMITTING AND RECEIVING DIGITAL DATA OVER A BANDPASS CHANNEL (2001)

US 5,838,727 METHOD AND APPARATUS FOR TRANSMITTING AND RECEIVING DIGITAL DATA OVER A BANDPASS CHANNEL (1998)

US 5,331,318 COMMUNICATION PROTOCOL FOR DIGITAL TELEMETRY SYSTEM [CLOCK SYNCHRONIZATION] (1994)

US 5,253,271 METHOD AND APPARATUS FOR QUADRATURE AMPLITUDE MODULATION OF DIGITAL DATA USING A FINITE STATE MACHINE (1993)

US 5,191,326 COMMUNICATION PROTOCOL FOR DIGITAL TELEMETRY SYSTEM [RETRANSMISSION PROTOCOL] (1993)

US 4,992,790 DIGITAL PHASE LOCKED LOOP BIPHASE DEMODULATING METHOD AND APPARATUS (1991)

US 4,868,569 BIPHASE DIGITAL LOOK-AHEAD DEMODULATING METHOD AND APPARATUS (1990)

I am the author of over a dozen published peer-reviewed papers in the field of well-logging wireline telemetry, include best paper awards in 1988 for "Evolution Of The Digital Telemetry System Protocol" and in 1990 for "Finite State Machine Implementation of a Quadrature Amplitude Modulator".

I am familiar with the above-referenced patent application, and have reviewed the prior art cited by the Examiner therein, as well as the reasons for rejection of the claims in that application stated by the Examiner. I believe that the claimed invention is not obvious for the following reasons.

Some of the most difficult aspects of well-logging wireline communications stem from the harsh environment for such operations. The conditions in a well-bore raise challenges not found in most other communications

environments. Thus, novel techniques must be used to adapt methods that might be suitable for a less demanding environment to the rigors of the well-bore environment.

One challenge is dealing with the high temperature and high shock encountered in the borehole environment and the resulting effects on electronic circuitry. Borehole equipment is often exposed to shocks well over 10G, which can often break loose surface mounted components unless special precautions are taken, or through-hole versions of the parts are used instead. Borehole temperatures are often quite high. Borehole electronics is usually designed to withstand temperatures of 175 or 200 degrees Celsius, with special cooling environments for even high temperatures. Most commercial components are only rated for 70 or 85 degrees Celsius; even military grade components are only rated to 125 degrees Celsius. Components must be specially designed or selected for higher temperatures to be suitable for borehole electronics. This limits the components available. So a technique that called for a particular kind of component might need major rework in an environment where that kind of component will not work.

In addition, certain silicon characteristics that could be ignored at lower temperatures become dominant at 175 C, such as leakage currents. For high temperature environments, standard design techniques often fail because they do not take into account such effects that are negligible at lower temperatures. For example, balanced circuits must often be used to suppress leakage currents. Again, substantial innovation is often required to use even what might be considered conventional techniques to adapt them to a borehole environment.

Another challenge is dealing with a radically changing communication channel not found in most other systems. As the tool is lowered into the borehole, the tool and cable heat up. The change in cable characteristic as a cable slowly heats from 20 C to 200 C radically alters the transmission channel characteristics over time. In addition, tool power of hundreds of volts and over one thousand watts is transmitted on the same wires used for the channel, adding noise to the channel as tool power requirements vary. Therefore, borehole communications requires compensation and channel adaptation techniques rarely found in other environments. A DSL telephone system might have to deal with two versions of the transmission channel: one version when the voice channel is in use, and another version when the voice channel is not in use. This situation encountered in telephony is trivial compared to the wireline channel, where the channel characteristics are continuously variable over a far wider range of variance. The vast majority of communication techniques are simply not suited for dealing with such variance.

One of the major innovations of the current invention is the novel and highly optimized manner in which the communications channel is subdivided and adapted as the various subchannels undergo often major changes in transmission characteristics over time, necessitating the shift of transmission load between subchannels to reoptimize based on ever changing subchannel characteristics.

The art cited provides no clue as to whether the components or design techniques would even work in the hostile borehole environment, or with a radically changing communications channel, or what techniques might be required to adapt to such a hostile environment. Much of the art cited is like using prior art for bathroom tiles to infer that it is obvious to one of ordinary skill in the art to design such tiles to

protect the space shuttle from reentry. This would clearly be absurd. Thc same could be said for taking a telephone system design intended to operate at room temperature or commonly encountered surface temperatures on 22 gauge copper twisted wire, and assuming that such techniques could be used in the borehole environment. Just connect 400 volts (as one typically encounters in well-logging wireline-telemetry) to standard home telephone wires and to observer the folly of this expectation.

For these reasons, a person skilled in the art would not be motivated to modify the prior art references from the ADSL domain, e.g., Matsumoto or Bae, for use in well-logging wireline telemetry. Furthermore, for those same reasons, a person skilled in the art would not be motivated to combine the references dealing with telephony based digital communications technology, e.g., Matsumoto, Bae, Isaksson, Van Kerchove, and Tzannes with the references from the well-logging wireline telemetry field, e.g., Rasmussen, Gardner, and Baird.

For the reasons given above, a person skilled in the art would not expect success from combining telephone system technologies in well-logging wireline telemetry, e.g., Matsumoto, Bae, Isaksson, Van Kerchove, and Tzannes with thc references from the well-logging wireline telemetry field, e.g., Rasmussen, Gardner, and Baird.

Furthermore, I declare that I concur with the Declaration of Dr. Lloyd Clark filed concurrently herewith including Dr.Clarks declarations with respect to the specific prior art references cited against the claims of the present patent application.

In summary, prior art must be applicable by someone of ordinary skill of the art. With such a radically different environment for borehole electronics, I defy

anyone of ordinary skill in the art to apply the cited referenccs to a borehole environment. An inventive step is most definitely required, and in some cases, as an *expert* in the field, it is not clear to me that the techniques cited in the art could even be adapted to the borehole environment by an expert in the field.

I further declare that all statements made herein of my own knowledge are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully,

Michael A. Montgomery

Michael Montgomery

12/9/05

Date